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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/791,521	03/02/2004	Richard S. Greenberg	130.1.005 C-2	2769

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WATOV & KIPNES, P.C.
P.O. Box 247
Princeton Junction, NJ 08550

EXAMINER	
HERTZOG, ARDITH E	
ART UNIT	PAPER NUMBER
1754	

DATE MAILED: 05/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/791,521	GREENBERG, RICHARD S.	
	Examiner	Art Unit	
	Ardith E. Hertzog	1754	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 March 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☒ Claim(s) *4 and 10* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Priority/Response to Amendment/Effective Filing Date

1. This application is a continuation of application number 09/611,591 filed July 7, 2000, now abandoned, which is a continuation-in-part of application number 09/062,838 filed April 20, 1998, now abandoned. The preliminary amendment filed March 2, 2004 has been entered, and claims 1-16 and 18-21, per said amendment, are pending. **However**, the numbering of claims is not in accordance with 37 CFR § 1.126, which requires the original numbering of the claims to be preserved throughout the prosecution. When new claims are presented, they must be numbered consecutively beginning with the number next following the highest numbered claim previously presented (whether entered or not). Misnumbered new claims 18-21 have been renumbered 17-20; that is, any preliminary amendment in this Rule 53(b) application should be with respect to the claims as originally filed (i.e., original claims 1-16).[1] **Thus, claims *1-20* are now pending**.

2. **Furthermore**, as all instant claims contain new matter with respect to parent application 09/062,838 (i.e., the 2% by volume lower limit of ozone in air, as recited in the independent claim 1), their effective filing date is that of the parent application—namely, **July 7, 2000**—in accordance with MPEP § 2133.01:

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[1] Although the preliminary amendment does not meet the requirements of Rule 121(c) (i.e., the amendments and status identifiers being with respect to the claims as last presented in parent application 09/611,591), it has nevertheless been accepted, since the status (and text) of renumbered claims 1-20—again, as presented in the preliminary amendment claims listing—is considered accurate and clear (see MPEP § 714 II.C.).

> When applicant files a continuation-in-part whose claims are not supported by the parent application, the effective filing date is the filing date of the child CIP. Any prior art disclosing the invention or an obvious variant thereof having a critical reference date more than 1 year prior to the filing date of the child will bar the issuance of a patent under 35 U.S.C. § 102(b). *Paperless Accounting v. Bay Area Rapid Transit System*, 804 F.2d 659, 665, 231 USPQ 649, 653 (Fed. Cir. 1986).

It is noted for the record that instant claims 13-15 contain **further** new matter with respect to parent application 09/062,838 (i.e., the range of claim 13; the range of claim 14; and the 12% by volume upper limit of claim 15).

Claim Objections

3. Claim 4 is objected to, because it appears that "further" should be deleted (since "generating", as now recited in independent claim 1, would appear to encompass "forming"). Appropriate correction is required.

4. Claim 10 is objected to, because it appears that "comprising" should be inserted after "claim 1". Appropriate correction is required.

Claim Rejections - 35 U.S.C. § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. § 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 7 and 8 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Said claims are considered vague, indefinite, and/or confusing, due to antecedent basis problems. In both claims, "the step of adding" lacks

antecedent basis; in addition, it is not clear if "a reactive species", as recited in both claims, necessarily refers back to **the** "reactive species" of independent claim 1. Claim 7 is further unclear, in reciting "at least a portion of the reactive species comprising hydroxyl radicals", whereas independent claim 1 **already requires** "reactive species principally in the form of hydroxyl radicals" (i.e., "principally in the form of" narrower in scope than "at least a portion of"). Deleting claim 7 and revising the body of claim 8 as "said method further comprising monitoring the concentration of the reactive species in the in situ environment" would appear to be one means of overcoming this rejection. Appropriate correction is required.

Claim Rejections - 35 U.S.C. § 103

7. The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 1-20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over the November 1994 Chemical Engineering article by Nelson and Brown, "Adapting Ozonation for Soil and Groundwater Cleanup" (hereinafter "Nelson") in view of US 5,663,475 (Elgal) and US 5,130,053 (Feasey et al., hereinafter "Feasey"). Nelson teaches several advantages of ozonation for site remediation, stating that "[s]oil or groundwater ozonation can be carried out in situ", per ***instant claim 1*** (see p. EE-18, cols. 1 and 3). In particular, Nelson teaches that:

> Ozone spontaneously decomposes to oxygen, forming hydroxyl radicals as intermediate species. Certain conditions favor the decomposition of ozone. For instance, ozone decomposes to hydroxyl radicals... when reacted with hydrogen peroxide. These conditions may be exploited during design, to promote the formation of hydroxyl radicals. (p. EE-21, col. 1).

Thus, Nelson teaches "administering... peroxide and... ozone to the in situ environment under spatial and temporal control conditions to form a reactive species principally in the form of hydroxyl radicals to oxidize at least one of the contaminants", as recited in ***instant claim 1***; that is, in the Nelson processes, "the reactive species (e.g. hydroxyl radical) is able to be generated into areas where contaminants are present" and hence "enables temporal and spatial control of the oxidation process", as discussed at page 6, lines 10-13, of applicant's specification. In addition, it is respectfully submitted that such "reactive species" formation must occur "without acidification of the environment", as further recited in ***instant claim 1***, given that Nelson **clearly** teaches **in situ** ozonation via the **same** "reactive species" recited therein. Thus, Nelson at least **inherently** teaches "administering... peroxide and... ozone to the in situ environment under spatial and temporal control conditions to form a reactive species principally in the form of hydroxyl radicals to oxidize at least one of the contaminants without acidification of the environment", as recited in ***instant claim 1***. Note that Nelson analogously teaches the "reactant species" limitations of ***instant claims 7 and 8***, including the specific hydrogen peroxide of ***instant claims 2 and 3***. It would have been obvious to one of ordinary skill in the art, at the time of applicant's invention, to have monitored the concentration of hydroxyl radicals in the Nelson processes, per ***instant claim 8***, because Nelson **clearly** teaches that it is this "reactive species" responsible for the oxidation of organic

contaminants (see "Harnessing two mighty oxidants" section at p. EE-19 – p. EE-20). Applicant's specific sequences of in situ peroxide-ozone addition—"first adding... the peroxide... and then adding the ozone", per ***instant claim 6***, and/or "allowing the... peroxide to migrate... and then adding the ozone", per ***instant claim 17***—are considered to have been obvious to one of ordinary skill in the art, at the time of applicant's invention, because Nelson **clearly** teaches in situ ozonation **with** hydrogen peroxide, **and** it has been held that selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results (see *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946)), while selection of any order of mixing ingredients is *prima facie* obvious (see *In re Gibson*, 39 F.2d 975, 5 USPQ 230 (CCPA 1930)). Nelson also teaches:

> The emergence of in situ ozonation techniques for soil and groundwater remediation is the direct result of advances made in **air sparging** technology in the last two years. ... For in situ ozonation, a properly designed **air sparging** system is an effective way to deliver ozone to the **subsurface**. (p. EE-18, col. 3 – p. EE-19, emphasis added)

Thus, the "fractured bedrock" limitations of ***instant claims 9 and 12*** are considered to have been obvious to one of ordinary skill in the art, at the time of applicant's invention, because the artisan would have readily recognized bedrock as one such suitable "subsurface". When having done so, it would have been further obvious to the artisan to have determined with minimum testing effective injection pressures, per ***instant claims 10-11***, because, absent contrary evidence, optimization of **any** standard processing parameter of the in situ ozonation techniques discussed in Nelson—including injection pressure—is considered to have been within the level of ordinary

skill; note the "relatively high air pressure... near the injection point" in the exemplary in situ application highlighted by Nelson (see p. EE-22, col. 2). Similarly, the injection of ozone at multiple points, per ***instant claims 16 and 18***, would have been obvious to one of ordinary skill in the art, at the time of applicant's invention, because such systems were evidently known in the air sparging art (as evinced by US 6,403,034 (also to Nelson and Brown); see col. 9, lines 41-60, especially col. 9, lines 42-45). Lastly, Nelson teaches that "[c]omprehensive site evaluation and **preliminary treatability studies** can allow site owners to design a cost-effective ozonation program" (see p. EE-20, Fig. 2, emphasis added), thereby at least suggesting the "predetermining" step(s) of ***instant claims 19-20***; see **also** the Table, where Nelson discloses that "in each case, the application of ozone was tailored to match site-specific contaminants" (see p. EE-21). **However**, Nelson fails to teach that the hydrogen peroxide should be "stabilized", per instant claim 1 (and instant claims 4-5), as well as relative proportions of peroxide and ozone reactants, per instant claim 1 (and instant claims 13-15).

9. Elgal exemplifies in situ treatment of soil contaminated with petrochemicals by injecting a "process mixture" of ozone and hydrogen peroxide (see Example 2 in col. 5). Furthermore, Elgal teaches that such "process mixture" has an ozone concentration of 4%, per ***instant claims 1 and 15***, and that the hydrogen peroxide concentration may be as high as 30%, per ***instant claims 1 and 13***, generally teaching a hydrogen peroxide to ozone weight ratio of 1:4, per ***instant claim 14*** (see col. 4, lines 54-64). Feasey teaches stabilization of concentrated hydrogen peroxide solutions, noting that "[c]oncentrated aqueous solutions of hydrogen peroxide suffer from the problem of

decomposition during storage or use... [and] [t]here have been many proposals for stabilizing hydrogen peroxide solutions..." (see col. 1, lines 9-11, 22-23). Furthermore, Feasey establishes that, at the time of applicant's invention, "phosphates, by which term is meant not only phosphoric acid itself and salts thereof, but also the condensed phosphate species...", per ***instant claims 4-5***, were known in the art as hydrogen peroxide stabilizers (see col. 4, lines 64-68; col. 5, lines 12-16). **Thus**, it would have been obvious to one of ordinary skill in the art, at the time of applicant's invention, to have utilized relative proportions of peroxide and ozone reactants, per ***instant claim 1***, as well as ***instant claims 13-15***, in the Nelson processes **and** to have "stabilized" the hydrogen peroxide, per ***instant claim 1***, via the addition of the specific acids/salts of ***instant claims 4-5***, because, as just discussed, Elgal teaches that relative proportions falling within the scope of applicant's claims are suitable for in situ treatment of contaminated soil, **and** Feasey establishes that such hydrogen peroxide stabilization was known in the art.

10. Claims 1-20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over US 5,741,427 (Watts et al., hereinafter "Watts"). Initially, it is noted that Watts is available as prior art under 35 U.S.C. § 103(a) based upon 35 U.S.C. § 102(**b**), given that the effective filing date of all instant claims is July 7, 2000. Watts teaches soil and/or groundwater remediation processes comprising adding a source of an oxidizing agent to the in situ environment (see abstract). In particular:

> The sources of oxidizing agents employed in the present invention are those that typically generate free radicals (e.g. hydroxyl radicals) and include peroxides such as hydrogen peroxide, calcium peroxide, sodium peroxide...

> Another suitable source of the oxidizing agent is ozone. Ozone has previously been used as a disinfectant and in more recent applications to oxidize refractory organic contaminants. Ozone under well known conditions can generate hydroxyl radicals which is a preferred oxidizing agent.
>
> **The peroxides and ozone, as exemplary hydroxyl radical producing compounds, can be used alone or in combination with ultraviolet radiation. What is essential is that the source of the oxidizing agent be capable of generating hydroxyl radicals in sufficient quantity to convert existing contaminants (hydrocarbons) to harmless compounds (e.g. carbon dioxide and water vapor).**
>
> Prior to injection, the source of the oxidizing agent is preferably stabilized. Suitable stabilizers include acids and salts thereof. The most preferred acid is phosphoric acid and the most preferred salt is monopotassium phosphate. (col. 4, lines 12-15, 25-40, emphasis added)

Watts further teaches "temporal and spatial control of the oxidation process" (see col. 2, lines 47-51). **Thus**, Watts teaches processes meeting all material limitations of ***instant claims 1-5, 7 and 13-15***, **except** for the relative proportions of peroxide and ozone reactants; note that applicant's "without acidification of the environment" limitation, as recited in ***instant claim 1***, is considered **inherent** in the above teachings of Watts, given that Watts **clearly** teaches **in situ** treatment via the **same** "reactive species" recited therein. **However**, it would have been obvious to one of ordinary skill in the art, at the time of applicant's invention, to have determined with minimum testing suitable relative proportions of **any** oxidizing agent mixture taught by Watts, because, absent contrary evidence, optimization of relative proportions is considered to have been within the level of ordinary skill, especially as Watts **explicitly** states, "What is essential is that the source of the oxidizing agent be capable of generating hydroxyl radicals **in sufficient quantity** to convert existing contaminants (hydrocarbons) to harmless compounds (e.g. carbon dioxide and water vapor)" (see again col. 4, lines 32-36,

36, emphasis added). Similarly, applicant's specific sequences of in situ peroxide-ozone addition—"first adding... the peroxide... and then adding the ozone", per ***instant claim 6***, and/or the subsequent addition of ozone, per ***instant claim 17*** (noting that Watts teaches "allowing the... peroxide to migrate..." (see col. 3, lines 59-62)) are considered to have been obvious to one of ordinary skill in the art, at the time of applicant's invention, because Watts **clearly** teaches the use of oxidizing agent **mixtures** for in situ remediation, **and** it has been held that selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results (see *In re Burhans*, *supra*), while selection of any order of mixing ingredients is *prima facie* obvious (see *In re Gibson*, *supra*). Watt further teaches the "monitoring" step of ***instant claim 8***, as well as the "predetermining" step(s) of ***instant claims 19-20*** (see col. 3, lines 20-25; col. 6, lines 1-33; col. 7, lines 26-30). The "fractured bedrock" and "elevated pressure" limitations of ***instant claims 9-12*** are also taught by Watts (see col. 5, lines 40-42, 55-57). In the Watts examples, evidently more than one injection point is used, per ***instant claims 16 and 18*** (see col. 8, lines 57-67). Lastly, the instant claims—with "comprising" language—are **open** to the presence of the Watts "reaction product complex of a ligand donor and a metal catalyst". **In summary**, Watts would have rendered methods falling within the scope of **all** instant claims *prima facie* obvious.

Response to Arguments

11. Applicant's arguments with respect to instant claims 1-20 have been fully considered but are basically deemed moot in view of the new grounds of rejection. With

respect to Elgal, applicant's arguments have been fully considered but not found persuasive. That is, it is respectfully maintained that Elgal Example 2 **is** indeed an in situ treatment of contaminated soil, for the reasons set forth in the Advisory Action (paper no. 22) mailed August 18, 2003, such reasons **expressly incorporated by reference herein**. In addition, note that Elgal Example 3 also appears directed towards in situ treatment—namely, "soil vapor extraction systems wherein the vapors need to be vacuum extracted **from the ground** and be oxidized and remediated" (see cols. 5-6, emphasis added) (i.e., "solvent vapor extraction systems" discussed in the paragraph bridging pp. 12-13 of applicant's specification).

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. These references are considered cumulative to or less material than those discussed above and include all US patents cited during prosecution of both parent applications. **In particular**, US 6,319,328 (Greenberg et al.), available as prior art under 35 U.S.C. § 102(**e**), is considered **cumulative** to Watts applied above (see especially col. 5, lines 26-33). US 5,259,962 (Later) teaches ex situ treatment of contaminated soil via hydroxyl radicals in the gas phase, wherein the radicals are preferably created by a combination of hydrogen peroxide, ozone and UV light (see, for example, abstract).

13. Any inquiry concerning this communication should be directed to Ardith E. Hertzog at 571-272-1347. The examiner can normally be reached on Monday through

Friday (from about 7:30 a.m. - 3:30 p.m.).

14. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley S. Silverman, can be reached at 571-272-1358. The central fax number for all communications is now 571-273-8300.

15. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. For any questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

STANLEY S. SILVERMAN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700

AEH
April 24, 2006